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## HOW TO MAKE A WIND-MOVEMENT RECORDER FROM ANY SPARE DRUM-TYPE RECORDER

The automatic recording of wind movement is sometimes essential to experiments in forestry and watershed-management research. Wind-movement data are often obtained by periodic reading of the anemometer dial, but occasionally data are required for variable intervals and at times when observations cannot be made easily. Instruments designed to record wind movement are being manufactured, but they are multiple-stage recorders and are expensive. To our knowledge, no instrument is made for the sole purpose of recording wind movement. So we devised an easy and inexpensive way to convert any drum-type recorder into a wind-movement recorder.

The study that occasioned the need for such a device required the measurement of wind movement at several places for the period 10 a.m. to 10 p.m. daily, including weekends. Two recording rain and snow gages, Weather Bureau type, were temporarily available; so we converted them to record continuous wind movement. When they are needed again for recording precipitation, they can be reconverted in a few minutes.

Figure 1 shows the base and the weighing mechanism of the rain gage converted to record wind movement. The weighing platform has been immobilized by turning down the stop screws, and the linkage has been removed from the pen-arm shaft. Parts A, B, and C have been added.

Part A is a piece of 16-gage sheet metal about 1½ inches wide and 20 inches long, bent to fit between the arms of the weighing mechanism.

It has been drilled to allow the pen arm shaft to pass through it; the shaft also helps to hold it in position. A hole has been drilled in the rain-gage base to accept the bolt holding the sheet-metal support.

The U-shaped part, B, also made of 16-gage sheet metal, keeps the counterweight, D, from falling down. It will swivel and thus is adjustable to control the amount of pen travel. Part C is an electromagnet;

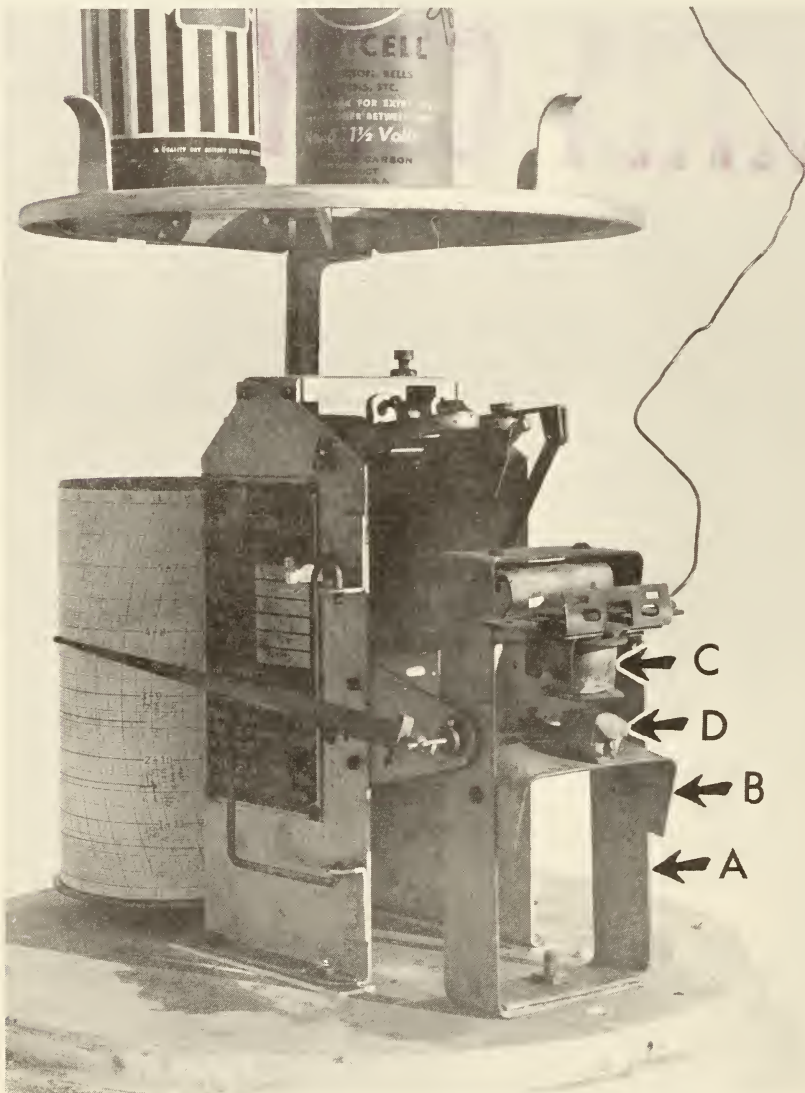


Figure 1.—A rain gage converted to record wind movement.  
For description of lettered parts, see text.

this one was taken from an old automobile relay, but any kind of low-voltage electromagnet will suffice.

The counterweight, D, is wrapped with masking tape to keep it from sticking to the magnet. In some gages the counterweight is made of lead and is not attracted magnetically. If so, it should be replaced with a steel counterweight, or it may be wrapped with a piece of sheet steel to make it attractive to the magnet.

A low-voltage electromagnet can usually be energized sufficiently with two 1½-volt dry cells. If line current is available, a low-voltage transformer can be used. The voltage should be as low as possible to prevent sparking and damage to the anemometer points.

The dry cells are connected in series with the anemometer contacts and the electromagnet. When the anemometer contact points close, the electromagnet is activated, lifting the counterweight and lowering the pen, thus making a vertical mark on the chart. Each vertical mark represents 1 mile of wind movement, and the marks are totaled to provide a measurement of wind movement for the period desired, as read from the time scale on the chart.

A variety of time scales are available for this model of recording rain gage: 6, 12, 24, 48, 96, and 192 hours. In the study described, 96-hour gears and charts were employed, requiring servicing twice weekly. One chart may be used for 3 or 4 traces by moving the pen arm up or down. The set screw should be tightened just enough so that the pen arm can turn on its shaft with moderate pressure.

When wind speeds are too great for recording each mile at the slower chart-drum speeds, clock speed can be increased, or the anemometer dial can be modified to cause contact once every 2 miles or once every 5 miles. The outer anemometer dial has 10 fingers, which close the electrical contacts once each mile of wind movement. At one location, we removed all fingers from the dial except those at 0 and 5; the record then consisted of a mark every 5 miles, sufficient to provide a reliable average in miles per hour. The dial itself is left intact so that total wind movement between visits may be read from the odometer, providing a check on the chart record.

As the only pertinent parts of the recorder for this purpose are the chart drum and the pen-arm assembly, any recording instrument that has these components is suitable for recording wind movement. We also adapted a spare hygrothermograph for this purpose. Although both the recording rain gage and the hygrothermograph are fairly expensive instruments, they are often temporarily available, are much less expen-

sive than the standard recorder for wind movement, and may be reconverted to their original use without difficulty.

If no instrument is available, the necessary parts may be purchased separately for about \$80 and mounted on a heavy wooden or metal base.

A parts list with approximate prices follows:

1 piece 16-gage sheet metal 1½ x 26 inches	\$ .50
1 electromagnet	2.00
15 feet bell wire, plastic covered	.25
Assorted nuts and bolts	.25
2 dry cells, No. 6	1.90
(Or 1 bell transformer, 6-volt)	(1.75)

The above parts may be purchased locally or from a mail-order catalog. The following parts, needed if no spare instrument is available, may be obtained from one of several instrument makers. Names will be furnished upon request.

1 clock with chart cylinder	\$71.00
1 pen-arm shaft	1.50
1 pen-arm assembly with bracket	4.50
1 pivot	1.00
1 counterweight	.75

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